

## WEST Search History

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DATE: Tuesday, July 17, 2007

Hide?	Set Name	Query	Hit Count
		<i>DB=USPT,PGPB; PLUR=YES; OP=OR</i>	
<input type="checkbox"/>	L45	('5675635'  '5722418'  '5793969'  '5796393'  '5835896'  '5875432')![pn]	6
		<i>DB=USPT; PLUR=YES; OP=OR</i>	
<input type="checkbox"/>	L44	(5572421 or 6196970).pn.	2
<input type="checkbox"/>	L43	6022315.pn.	1
		<i>DB=PGPB,USPT; PLUR=YES; OP=OR</i>	
<input type="checkbox"/>	L42	20040078373	1
<input type="checkbox"/>	L41	20010054046 20050182669 20040103065 20050198212	4
		<i>DB=USPT; PLUR=YES; OP=OR</i>	
<input type="checkbox"/>	L40	6,289,513.pn.	1
		<i>DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=OR</i>	
<input type="checkbox"/>	L39	L38 and (administrat\$ same questionnaire\$1)	10
<input type="checkbox"/>	L38	L35 and logic	65
<input type="checkbox"/>	L37	L35 and ((customiz\$ or personaliz\$) near2 logic)	0
<input type="checkbox"/>	L36	L35 and (((customiz\$ or personaliz\$) near2 logic) same questionnaire\$1)	0
<input type="checkbox"/>	L35	L33 and interface\$1	128
<input type="checkbox"/>	L34	L33 and ((collect\$ or gather\$) adj interface\$)	0
<input type="checkbox"/>	L33	L32 and ((set or sequence) near2 question\$1)	143
<input type="checkbox"/>	L32	L31 and ((collect\$ or gather\$) near2 (questionnaire\$1 or (question adj set\$) or survey\$ or test\$1 or assessment\$1))	344
<input type="checkbox"/>	L31	L29 and (questionnaire\$1 or (question adj set\$) or survey\$ or test\$1 or assessment\$1)	1780
<input type="checkbox"/>	L30	L29 and ((customiz\$ or personaliz\$) near logic)	22
<input type="checkbox"/>	L29	L28 and L12	2133
<input type="checkbox"/>	L28	L27 and L7	11780
<input type="checkbox"/>	L27	L26 or L25 or 24	7312898
<input type="checkbox"/>	L26	705/35.ccls.	2945
<input type="checkbox"/>	L25	707/(10,102).ccls.	112319
<input type="checkbox"/>	L24	715/(505,526).ccls.	100987
<input type="checkbox"/>	L23	L7 and (trigger adj execution)	7
<input type="checkbox"/>	L22	user-defined adj branching adj logic	2
<input type="checkbox"/>	L21	L20 and interface\$	11
<input type="checkbox"/>	L20	L19 and (trig\$ or track\$)	12
<input type="checkbox"/>	L19	L18 and (compile\$ or execut\$)	13
<input type="checkbox"/>	L18	L17 and predetermin\$	18

<input type="checkbox"/>	L17	L13 and (questionnaire\$1 with customized)	35
<input type="checkbox"/>	L16	L13 and questionnaire\$1	734
<input type="checkbox"/>	L15	L13 and (customized with questionnaire\$1)	0
<input type="checkbox"/>	L14	L13 and (questionnaire\$1 near2 customized)	0
<input type="checkbox"/>	L13	L12 and L7	2752
<input type="checkbox"/>	L12	answer\$1 near question\$1	23165
<input type="checkbox"/>	L11	L10 and hierarch\$	5
<input type="checkbox"/>	L10	L8 and interface\$1	18
<input type="checkbox"/>	L9	L8 and (collection adj interface\$)	0
<input type="checkbox"/>	L8	L7 and questionnaire\$1	49
<input type="checkbox"/>	L7	(collect\$ or gather\$) with (question\$ or evaluation\$)	17373
<input type="checkbox"/>	L6	(questionare\$ near2 computer\$) same(data adj collection)	0
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<input type="checkbox"/>	L5	(questionare\$ near2 computer\$) and (data adj collection) and (user near2 custom\$3)	0
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<input type="checkbox"/>	L2	6,108,665.pn.	1
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END OF SEARCH HISTORY

example, we can survey project managers about on-going projects and their characteristics in order to predict how much effort they will require. We can correlate the predictions with the outcomes to assess predictive criterion validity.

### Construct validity

Construct validity concerns how an instrument "behaves" when used. We can think of this behavior in two ways. *Convergent* construct validity assesses the extent to which different data collection approaches produce similar results. *Divergent* construct validity assesses the extent to which results *do not correlate* with similar but distinct concepts. It often requires many years of experience to assess construct validity properly.

### Validity and Reliability in Software Engineering Surveys

Generally, software engineering surveys are weak in the area of validity and reliability. For example, for many years, in the extensive literature relating to the CMM, there was only one reference to a reliability coefficient (the Cronbach's alpha) and that concerned the 1987 version of the Maturity Questionnaire [5]. Of the three surveys we discussed in part 1 of this series, only the Finnish Survey [8] made a concerted effort to undertake reliability and validity studies. Our own studies of technology adoption used face validity only. Lethbridge [6] and [7] discusses the basis for his questions, but his discussion of validity is based only on a post-hoc assessment of possible responder bias.

In contrast, the Finnish researchers used a panel of experts to judge the content validity of the questions. They also attempted to assess the internal reliability of their instrument. Unfortunately, they did not perform an independent pilot study. They analyzed their survey responses using principal components to identify strategies for managing risks. They then derived Cronbach alpha statistics [2] from the same responses. They found high values and concluded that their survey instrument had good reliability. However, Cronbach alpha values were bound to be high, because they measure the structure already detected by the principal component analysis.

### Survey Documentation

After the instrument is finalized, Bourke and Fielder [1] recommend starting to document the survey. If the survey is self-administered, you should consider writing an initial descriptive document, called a *questionnaire specification*. It should include:

- The objective(s) of the study.
- A description the rationale for each question.
- The rationale for any questions adopted or adapted from other sources, with appropriate citations.
- A description of the evaluation process.

Furthermore, once the questionnaire is administered, the documentation should be updated to record information about:

- Who the respondents were.
- How it was administered.
- How the follow-up procedure was conducted.

- How completed questionnaires were processed.

One of the major reasons for preparing documentation during the survey is that surveys can take a long time. It may be many months between first distributing a questionnaire and when we are able to analyze results. It takes time for respondents to reply and for the researchers to undertake all necessary follow-up procedures. This time lag means that it is easy to forget the details of instrument creation and administration, especially if documentation is left to the end of the study. In general, it is good research practice to keep an experimental diary or log book for any type of empirical studies

When questionnaires are administered by interview, specifications are referred to as *interviewer specifications* and can be used to train interviewers as well as for reference in the field.

Once all possible responses have been received and all follow-up actions have been completed, we are in a position to analyze the survey data. In the next two articles, we discuss survey sampling and analysis issues.

### References

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- [2] L.J. Cronbach, "Coefficient alpha and internal structure of tests," *Psychometrika*, 16(2), 1951, pp. 297-334.
- [3] El Emam, K., Goldenson, D., Briand, L. and Marshall, P. Interrater Agreement in SPICE Based Assessments, *Proceedings 4<sup>th</sup> International Software Metrics Conference*, IEEE Computer Society Press, 1996, pp 149-156.
- [4] El Emam, K., Simon, J-M., Rousseau, S. and Jacquet, E. Cost implications of Interrater Agreement for Software process Assignments. *Proceedings 5<sup>th</sup> International Software Metrics Conference*, IEEE Computer Society Press, 1998, pp 38-51.
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- [8] J. Ropponen and K. Lyytinen, Components of software development risk: How to address them. A project manager survey, *IEEE Transactions on Software Engineering* 26(2), February 2000.
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